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Remarks/Arguments

Reconsideration of the application is requested for reasons set forth below.

Claims 19-25 are pending in this application. Claim 18 has been canceled and claims 19,20,22,23, and 25 have been amended.

Referring to the office action, claims 19,10 and 25 have been objected to as being informal in depending on canceled claims. These claims have been amended to correct their dependency on canceled claims.

Claims 22 and 23 were rejected on the second paragraph of 35 USC 112 as being indefinite. These claims were amended to overcome the indefiniteness by changing the phrase "gradually graded" to "graded" and the phrase "hybrid multilayered materials" to "multilayered material," pursuant to the Examiner's suggestion.

Claims 18 and 19 were rejected under 35 USC 102(e) as being anticipated by the Chow reference. Since claim 18 has been canceled, issues pertaining thereto are moot. Claim 19 has been amended to include that the thin film or coated material contains an oxide selected from alumina, zirconia, yttria, or a mixture of some or all of these. The Chow reference is devoid of a disclosure that would anticipate the amended claim 19.

Claims 18-25 were rejected under 35 USC 102(e) as anticipated by

or under 35 USC 103(a) as obvious over the Glumac reference. It is believed that the amended claims are neither anticipated nor rendered obvious by the Glumac reverence. With claim 18 being canceled, all pending claims, i.e., claims 19-25, are limited to a thin film or coated material as containing alumina, zirconia, yttria, or mixtures of two or more of these. It is believed that the Glumac reference neither anticipates nor obviates claims 19-25.

As the Glaumac reference discloses starting in line 21 in col. 1, nanophase powders have been produced in experimental quantities for over a decade. The prior art methods of producing the nanophase powders vis-a-vis the Glumac reference, are limited in the capacity to produce commercial quantities. The invention disclosed in the Glumac reference is directed to a new chemical synthesis process for the production of commercial quantities of nanostructured ceramic powders starting from metalorganic precursors. Glumac's process can produce nanophase coatings and nanocrystalline free-standing forms, including sheets, rings, and drums. The preferred heat source for synthesis of the nanophase oxide powders is a flat-face combustor.

In the Glumac reference, the powders are formed by controlled thermal decomposition of a metalorganic precursor/carrier gas mixture in the flat-flame combustor. A low pressure is maintained in the reactor chamber by high-speed pumping. The flat combustion flame,

extending a few millimeters out of the burner, provides a uniform heat source with a short residence time of a fraction of a second for efficient thermal decomposition and reaction of the precursor/carrier gas stream. The substantial heat released in the flame allows the burner to support a high precursor flow rate at pressures as low as 1-50 mbars.

In reference to the bottom portion of p.4 of the office action, the Examiner refers to the limitation in claims 20,22, 24 and 25 that the film is made of more thatn one layer and the material is graded and states that the Glumac reference teaches that the nanophase coating may be multicomponent, multiphasic, compositionally modulated or continuously graded structures, citing col. 5, lines 28-39 of the Glumac reference which, in the Examiner's opinion, anticipates the claims. The pertinent portion of the Glumac matter in question reads as follows:

> "... Again in common with CVD, using two or more combustion flame reactors, nanophase coatings and parts with multicomponent, multiphasic, compositionally modulated or continuously graded structures can be produced..."

The above-quoted disclosure is not enabling but is prophetic. Claims 19-25 are generally directed to thin films or coating materials whereas the Glumac reference is directed to a method for of nanoparticle oxide

powders using the flame combustor, as its title, i.e., "Combustion Flame Synthesis of Nanophase Materials," intimates.

It is submitted that claims 19-25 are patentable over the Chow or the Glumac references and a notice of allowability of the claims is requested.

Attached hereto is a marked-up version of the changes made to the specification and the claims by the current amendment. The attached page is captioned **"Version with markings to show changes made."**

Respectfully submitted,
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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the specification:

Paragraph beginning at line 5 on p.1, introduced into the specification by the Preliminary Amendment dated Sept. 17,2001, has been amended as follows:

--CROSS REFERENCE TO RELATED APPLICATION

This application is a divisional of co-pending parent application Serial No. 09/106,456 filed June 30, 1998, and entitled "Nanosize Particle Coatings Made by Thermally Spraying Solution Precursor Feedstocks."--

[--CROSS REFERENCE TO RELATED APPLICATION

This application is a Continuation-In-Part of co-pending application Serial No. 09/019,061, filed Feb. 5, 1998, which issued as US Patent 6,025,034, by Strutt et al, which is a continuation of Application No. 08/558,133 filed Nov. 13, 1995, now abandoned.--]

In the claims:

Claim 18 has been canceled.

Claims 19, 20,22, 23 and 25 have been amended as follows:

19.(Amended) A thin film or coated material [by the method of Claim 1] having a nanostructured material with a particle size of less than 100 nm and containing an oxide selected from the group consisting of alumina, zirconia, yttria, and mixtures thereof.

20.(Amended) A multilayer thin film or coated material [made by the method of Claim 3,] having a nanostructured material with a particle size of less than 100 nm and containing an oxide selected from the group consisting of alumina, zirconia, yttria, and mixtures thereof.

22.(Amended) The multilayered thin film or coated material[made by the method of Claim 3] of Claim 21, wherein the layers are integrated by [gradually] graded interfaces rather than abrupt interfaces so as to permit the compatibility of [hybrid] multilayered materials.

23.(Amended) The multilayered coated material of Claim 22, wherein the [hybrid] multilayered materials are selected from the group consisting of ceramics-ceramics; metal-ceramics; metal-metal; organic-inorganic and mixtures thereof.

25.(Amended) The [A] graded thin film or coated material of Claim 20 [made by the method of Claim 4,] having a nanostructured graded material and fine scale grading, both compositionally and microstructurally..